BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
26 April 2001 (26.04.2001)

PCT

(10) International Publication Number
WO 01/29714 A2

(51) International Patent Classification[7]: G06F 17/50

(21) International Application Number: PCT/EP00/09681

(22) International Filing Date:
28 September 2000 (28.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
MI99A002164 15 October 1999 (15.10.1999) IT

(71) Applicant *(for all designated States except US)*: **ABB RICERCA SPA** [IT/IT]; Viale Edison, 50, I-20099 Sesto San Giovanni (IT).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **TORMENE, Guido** [IT/IT]; Via Montepulciano, 11, I-20124 Milano (IT). **SOZZI, Luigi** [IT/IT]; Via Luciano Manara, 57, I-27051 Cava Manara (IT). **GORLA, Fausto** [IT/IT]; Via Delle Tuberose, 4, I-20146 Milano (IT).

(74) Agent: GIAVARINI, Francesco; ABB Ricerca S.p.A., Viale Edison, 50, I-20099 Sesto San Giovanni (IT).

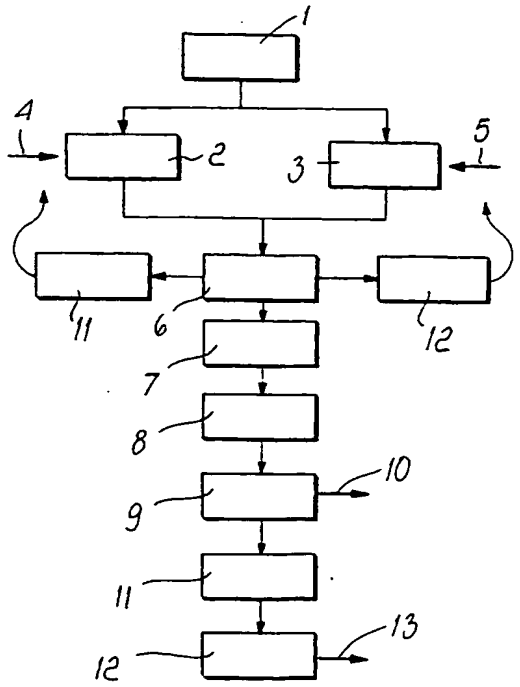
(81) Designated States *(national)*: AT, AU, BG, BR, CA, CN, CZ, DE, DK, ES, FI, GB, HR, HU, IL, IN, JP, KP, KR, LT, LU, MA, MX, NO, NZ, PL, PT, RO, RU, SE, SG, SI, SK, TR, UA, US, YU, ZA.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR DESIGNING AND ESTIMATING ELECTRICAL/FLUID-BASED NETWORKS



(57) Abstract: A method for performing the basic design, estimation and executive design of an electrical and/or fluid-based network, which comprises the stages of adopting a computerized medium and performing on said computerized medium a predefined sequence of steps.

WO 01/29714 A2

METHOD FOR DESIGNING AND ESTIMATING ELECTRICAL/FLUID-BASED NETWORKS

DESCRIPTION

The present invention relates to a method for designing and estimating electrical and/or fluid-based networks. In particular, the method according to the present invention allows to perform the basic design, estimation and executive design of an electrical and/or fluid-based network in a highly automated way while allowing easy use and exchange of information.

The method according to the present invention is described hereinafter with particular reference to the basic design, estimation and executive design of an electrical network of an industrial plant, constituted for example by electromechanical components, modules and electrical systems. This is not meant to limit in any way the inventive scope: the method according to the present invention can in fact be adopted successfully also for a fluid-based network, such as for example a gas distribution network or civil waterworks.

It is known that basic design and estimation activities are crucially important during proposal to the customer. These activities are highly complex, since they must use specific technological knowledge for the correct sizing of the components, modules and electrical and/or fluid-based systems included in the equipment to be used as well as knowledge related to the performance and costs of the products that are actually available.

The basic design and estimation activities are followed by executive design activity. This activity consists in the detailed design of all the elements of the electrical and/or fluid-based network in order to be able to perform installation.

It is known that executive design activities are generally not integrated with the basic design and estimation activities. Since these activities are often carried out by means of the contribution of different people at different times, non-systematic procedures are generally used. This makes quite difficult to share information and reuse earlier data. In particular, executive design is performed from scratch, separately from the previous activities. This fact, in addition to

causing a considerable increase in overall times and costs, can cause considerable problems in terms of consistency between the data and the technical choices adopted in the various activities.

Furthermore, different calculation tools are often used for the individual activities.

Although these calculation tools are an improvement in terms of speed of execution, they are certainly not satisfactory, since they provide partial information and do not allow to adequately integrating the various activities.

Furthermore, these calculation tools do not allow easy exchange of data and information, since they are often implemented in incompatible computer environments. This fact entails the need for considerable manual editing activity, with a consequent increase in times and costs. In view of the poor automation of the procedures that are generally followed, procedures for optimization in the choice of the individual electrical and/or fluid-based component, modules or systems used become difficult.

The aim of the present invention is to provide a method for performing the basic design, estimation and executive design of an electrical and/or fluid-based network, which allows performing all the required activities automatically and in an integrated manner.

Within the scope of this aim, another object of the present invention is to provide a method, which ensures easy and automatic exchange of data and information during its execution.

Another object of the present invention is to provide a method, which allows to easily performing methods for optimizing the individual electrical and/or fluid-based components, modules or systems used.

Another object of the present invention is to provide a method, which is easy to use and implement on commercially available computer media.

Thus, the present invention provides a method for performing the basic design, estimation and executive design of an electrical and/or fluid-based network, characterized in that it comprises the stages of:

a) configuring, in a predefined computerized medium, a computer environment

which is suitable for the interactive management of predefined data and/or commands;

b) acquiring, in said computer environment, first predefined data which relate to the general characteristics of said electrical and/or fluid-based network, said first predefined data being acquired at least partially from one or more predefined computer media which are connected to said computerized medium;

c) acquiring, in said computer environment, second predefined data which relate to the characteristics of the components of said electrical and/or fluid-based network, said second predefined data being acquired at least partially from said one or more predefined computer media connected to said first computerized medium;

d) providing, in said computer environment, on the basis of said first and second predefined data, a single-line diagram which relates to the logic arrangement and the physical connections of the components of said electrical and/or fluid-based network;

e) performing, in said computer environment, on the basis of said stage d), the basic sizing of said electrical and/or fluid-based network;

f) performing, in said computer environment, on the basis of said stage e), the basic engineering of said electrical and/or fluid-based network;

g) performing, in said computer environment, on the basis of said stage f), an evaluation of the costs for the installation of said electrical and/or fluid-based network;

h) performing, in said computer environment, on the basis of one or more of said stages d)...g), the detailed sizing of said electrical and/or fluid-based network;

i) performing, in said computer environment, on the basis of one or more of said stages d)...h), the detailed engineering of said electrical and/or fluid-based network.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of the method according to the present invention, illustrated only by way of non-limitative

example in the accompanying drawings, wherein the only figure 1 is a schematic view of the succession of stages implemented by the method according to the invention.

With reference to the figure 1, the method according to the invention provides for a stage a) (designated by the reference numeral 1) which consists in configuring, in a predefined computerized medium, a computer environment for design which is suitable for the interactive management of predefined data and/or commands.

It is possible to use, as first predefined computerized medium, commercially available processing systems, such as for example a simple client-server structure, provided with a Windows NT(R) operating system or an equivalent one. The computer environment for design preferably has a configuration, which can be similar to that of a Windows(R) computer environment, with the possibility of selecting, for the execution of commands, dedicated windows and icons, which are available for example in the form of toolbars. The configuration of this environment occurs by virtue of the use and execution of widely known configurable object-oriented programs. Advantageously, it is possible to use configurations, which have already been used and stored earlier.

Stage a) is particularly advantageous, since the operator, starting from the requirements of the current project, can configure an optimum work environment, having graphic tools which assist the operator, facilitating the execution of all the stages subsequently implemented by the method according to the invention.

In stage b) (reference 2), the method according to the invention acquires, in the computer environment configured in stage a), first predefined data (arrow 4) which relate to the general characteristics of the electrical and/or fluid-based network. For example, in the case of an electrical network, these data relate to the ambient temperature, the industrial main frequency and other general electrical values.

The data 4 are at least partially acquired from one or more predefined computer media, which are connected to the above described computerized medium.

These predefined computer media can be, for example, libraries or data banks and the connection to the computerized medium can occur according to the methods known in the art. Advantageously, it is possible to perform acquisition by importing, for example, appropriately configured files whose format can be of the Excel(R) or MKL(R) type. Acquisition can occur automatically, using the commands available in the computer environment configured in the above described stage a). In order to ensure maximum flexibility, stage b) can comprise the following steps:

i. automatic acquisition, from these one or more predefined computer media, of a first portion of the predefined data 4;

ii. integration, if necessary, of the first portion of the data 4 with a second portion of the data 4. This second portion is acquired from computer media, which are not predefined but are prepared on the spot by the operator. The non-predefined computer media can be of the same type as the ones described above or files appropriately prepared by the operator;

iii. integration, if necessary, of the first and/or second portion of the first predefined data with a third portion of the predefined data 4, acquired by manual editing. This allows the operator to enter portions of the predefined data 4;

iv. verification of the acquired predefined data 4.

In this manner, the operator can check and/or select the data acquired automatically and can optionally integrate them if necessary.

In stage c) (reference 3), the method according to the invention acquires in the computer environment configured in stage a) second predefined data (arrow 5) related to the characteristics of the components of the electrical and/or fluid-based network.

The data 5 can comprise, in the case of an electrical network:

-- data related to the electrical devices of the field, such as for example electric motors and/or controllers;

-- data related to electrical transformers and/or circuit breakers and disconnectors and/or electrical actuation and control devices.

Acquisition of the data 5 occurs in manners which are substantially similar to those described above and related to the data 4.

In particular, like stage b), stage c) can comprise the following steps:

v. automatic acquisition, from said one or more predefined computer media, of a first portion of the predefined data 5;

vi. integration, if necessary, of the first portion of the data 5 with a second portion of the data 5, acquired from non-predefined computer media;

vii. integration, if necessary, of the first and/or second portion of the first predefined data with a third portion of the predefined data 5, acquired by manual editing;

viii. verification of the acquired predefined data 5.

Like stage b), stage c) also ensures interactive management of the acquired data 5.

Stage d) (reference 6) of the method according to the invention consists in providing, on the basis of the data 4 and 5, in the computer environment configured in stage a), a single-line diagram. The single-line diagram relates the logic arrangement of the components of the electrical and/or fluid-based network and their physical connections. The single-line diagram is a logic representation of the information related to the components of the electrical and/or fluid-based network, according to a unifilar model.

This stage can provide for the following steps:

ix. definition of the logic links among the various components of the electrical and/or fluid-based network; thus, for example, their mutual positioning, et cetera;

x. definition of the mutual connections;

xi. definition of the values in input/output for said components.

For example, in the case of an electrical network, the single-line diagram represents the logic arrangement of the electromechanical components, of the modules and of the electrical systems, which belong to the equipment of the network.

Advantageously, the single-line diagram can have a graphical format, which

allows the selection, positioning and mutual connection of the various components and can indicate the main physical values that characterize each component. It is furthermore easily possible to provide all the main functions of computer-aided design. The various components can be advantageously selected from a list which is already available in computer format and is stored in said computerized medium or in said one or more second computer media.

The creation of a single-line diagram has the great advantage of making immediately available a considerable amount of information useful for performing the subsequently implemented stages, in a format, which can be used easily by the operator. This allows a considerable saving in design costs and times.

Preferably, the computer environment configured in stage a) can provide the information included in the single-line diagram both in paper form and in one of the known computer formats.

It should be noted that step xi. of stage d) is particularly advantageous, since it allows to determine the criteria according to which the various predefined that describe the electrical behavior of the various electromechanical components must interact with each other.

The subsequent stage e) (reference 7) consists in performing the basic sizing of the electrical and/or fluid-based network.

In practice, predefined rules stored in said one or more predefined computer media are used. These rules describe the electrical behavior of the individual components used. Evidently, by means of the computer environment configured in stage a), the operator can check the consistency of these rules, making changes where necessary. It is also possible to select different levels of man-machine interaction, which can range from complete automatic execution to step-by-step interaction with the operator.

Consistency of the overall sizing of the electrical equipment is ensured by the information contained in the single-line drawing described earlier.

Preferably, stage e) comprises one or more iterative procedures for optimizing the basic sizing of the electrical and/or fluid-based network. These procedures

can be based on the information acquired in one or more of the previous stages a)...d) and can be organized into the following sequence of steps:

xii. revision of the data related to the components of the electrical and/or fluid-based network;

xiii. selection of the suppliers of the components used;

xiv. selection, if necessary, of groups of components suitable to represent electrical and/or fluid-based modules and/or systems;

xv. sizing of the selected electromechanical components and/or groups of components.

Sizing can therefore follow a typical procedure of the bottom-up type. For example, in the case of an electrical system, starting from the electric motors and from the other low-voltage devices of the field, the higher-power devices (electrical cabinets and modules) are then sized, up to the medium-voltage supply network. This fact is particularly advantageous, since it entails considerable accuracy of the electrical calculations both for the corresponding components and for the equipment as a whole, i.e., considered as a complex system of components.

The use of one or more optimization procedures is particularly advantageous, since it allows comparing a plurality of technical solutions, using for example components and/or groups of components having different characteristics.

Stage f) (reference 8) of the method according to the invention entails performing, in said computer environment, on the basis of stage e), the basic engineering of the electrical equipment. Once component sizing has been performed in stage e), the components are implemented by means of devices available from suppliers. This stage, too, is managed interactively. Lists of available components are stored in said one or more predefined computer media: preferably, the main technical data, the type and cost of each component are listed. Advantageously, standard formats are used in the management of these lists, so as to be able to make a comparison in terms of cost/performance even for components originating from different suppliers.

Advantageously, stage f) also can comprise one or more iterative optimization

procedures, which preferably comprise the following sequence of steps:

xvi. definition of the allocation of the groups of electromechanical components defined in stage e). In practice, the engineering of the modules and of the electrical and/or fluid-based systems is performed first. This can occur according to various criteria: for example, in the case of an electrical system, maximum power dissipation, maximum bar current or minimum space that can be allocated for future applications;

xvii. definition of the electromechanical components of the electrical equipment among the components available from the suppliers selected in said stage e). This step, too, can be performed automatically or manually or according to different levels of interaction;

xviii. calculation of the space occupation and electrical losses of the components defined in step xvii.;

xix. defining the accessories of the electromechanical components among the available ones. This step can also be performed automatically or manually, with different levels of interaction.

Advantageously, the basic engineering stage allows gathering and making available all the information for estimating the costs of the electrical equipment. Like the previously described stages, it can be performed entirely within the computer environment configured during stage a), and advantageously man-machine interaction can be facilitated by virtue of the use of appropriate graphical tools.

The subsequent stage g) (reference 9) allows completing the estimation of the costs of the electrical and/or fluid-based network. It consists in performing, in the computer environment configured in stage a), an evaluation of the costs for installing the chosen equipment and in producing the corresponding specification and offer documents. Like the preceding stages, this stage also can be performed interactively. For example, in the case of an electrical network, costs evaluation can comprise:

-- calculation of the cost of the electromechanical components used, excluding the electric motors;

-- calculation of the cost of the electric motors;

-- calculation of the cost of the electric motors and of their accessories;

-- calculation of the cost of the main electric motors;

-- calculation of the cost of the auxiliary electric motors.

It is thus possible to gather all the information required, so as to prepare the specification and offer documents. Preparation of the specification and offer documents can occur in different manners according to the requirements of the customer. Said manners can be established by means of appropriate commands, which are available in the computer environment configured in stage a). In practice, the specification and tender offer (arrow 10) can be generated automatically according to the format set in advance by the operator.

The method according to the invention at this point entails performing, in the configured environment of stage a), stages h) and i) (references 11 and 12), which consist in performing, respectively, the detailed design and the detailed engineering of the electrical and/or fluid-based network. Stages h) and i) allow in practice to perform executive design activity.

Stages h) and i) in practice consist in repeating, in much greater detail, the above described stages e) and f). By using the same computer environment configured in stage a), this can occur consistently, automatically using all the information already acquired. Stages h) and i) are performed in an integrated manner with respect to the preceding stages, and in particular with the above described stages e) and f). Stages h) and i) of course require a larger amount of data, which can be acquired, as shown above, from one or more predefined computer media or directly from the operator according to various interaction criteria. Like the stages e) and f), stages h) and i) also can advantageously comprise one or more iterative optimization processes which automatically utilize all the information acquired in the preceding stages. In particular, stage h) allows to write the corresponding executive documents (arrow 13) required for the installation of the electrical and/or fluid-based network.

In practice it has been found that the method according to the invention fully achieves the intended aim and objects. It in fact allows to easily integrating with

each other the basic design, estimation and executive design activities of the electrical and/or fluid-based network.

By means of its organization into stages which can be easily mutually repeated, the method allows to consistently manage all the information required to perform the various activities. Implementation with computer and computerized media, which ensure interactive execution of the method according to the invention, furthermore allows easy reuse of earlier information and experience while ensuring a considerable reduction of times and costs.

Finally, the method according to the invention has proved itself easy to implement in commercially known computer media.

The method according to the invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent elements.

CLAIMS

1. A method for performing the basic design, estimation and executive design of an electrical and/or fluid-based network, characterized in that it comprises the stages of:

a) configuring, in a predefined computerized medium, a computer environment which is suitable for the interactive management of predefined data and/or commands;

b) acquiring, in said computer environment, first predefined data which relate to the general characteristics of said electrical and/or fluid-based network, said first predefined data being acquired at least partially from one or more predefined computer media which are connected to said computerized medium;

c) acquiring, in said computer environment, second predefined data which relate to the characteristics of the components of said electrical and/or fluid-based network, said second predefined data being acquired at least partially from said one or more predefined computer media connected to said first computerized medium;

d) providing, in said computer environment, on the basis of said first and second data, a single-line diagram which relates to the logic arrangement and the physical connections of the components of said electrical and/or fluid-based network;

e) performing, in said computer environment, on the basis of said stage d), the basic sizing of said electrical and/or fluid-based network;

f) performing, in said computer environment, on the basis of said stage e), the basic engineering of said electrical and/or fluid-based network;

g) performing, in said computer environment, on the basis of said stage f), an evaluation of the costs for the installation of said electrical and/or fluid-based network;

h) performing, in said computer environment, on the basis of one or more of said stages d)...g), the detailed sizing of said electrical and/or fluid-based network;

i) performing, in said computer environment, on the basis of one or more of

said stages d)...h), the detailed engineering of said electrical and/or fluid-based network.

2. The method according to claim 1, characterized in that said stage b) comprises the following steps:

i. automatically acquiring, from said one or more predefined computer media, a first portion of said predefined data;

ii. integrating, if necessary, said first portion of said first predefined data with a second portion of said first predefined data, said second portion of said data being acquired from non-predefined computer media;

iii. integrating, if necessary, said first and/or second portion of said first predefined data with a third portion of said predefined data, said third portion of said data being acquired by manual editing;

iv. executing a verification of said first acquired predefined data.

3. The method according to one or more of previous claims, characterized in that said stage c) comprises the following steps:

v. automatic acquiring, from said one or more predefined computer media, a first portion of said second predefined data;

vi. integrating said first portion of said second predefined data with a second portion of said second predefined data, said second portion being acquired from non-predefined computer media;

vii. integrating said first and/or second portion of said second predefined data with a third portion of said second predefined data, said third portion being acquired by manual editing;

viii. executing a verification of said second acquired predefined data.

4. The method according to one or more of previous claims, characterized in that said stage d) comprises the following steps:

ix. defining logic links among said components of said electrical and/or fluid-based network;

x. defining connections among said components;

xi. defining values in input/output for said components.

5. The method according to one or more of previous claims, characterized in

that said stages e) and/or f) and/or h) and/or i) comprise one or more iterative optimization procedures.

6. The method according to claim 5, characterized in that said iterative optimization procedures comprise the following steps:

xii. executing a revision of the data related to said electromechanical components;

xiii. selecting the suppliers of said electromechanical components;

xiv. selecting, if necessary, groups of said electromechanical components, said groups being suitable to represent electrical modules or panels;

xv. electrically sizing of said electromechanical components, of said groups of components, and of the electrical systems included in said electrical equipment.

7. The method according to claim 5, characterized in that said iterative optimization processes comprise the following steps:

xvi. defining the allocation of said groups of components defined in said stage e);

xvii. defining said components among the components available from the suppliers selected in said stage e);

xviii. calculating the bulk of said components;

xix. defining the accessories of the said components.

8. A data processing system, comprising a predefined computerized medium, said predefined computerized medium:

- comprising a computer environment which is suitable for the interactive management of predefined data and/or commands; and
- being connected to one or more predefined computer media;

characterized in that it implements a design and estimation method according to one or more of the previous claims.

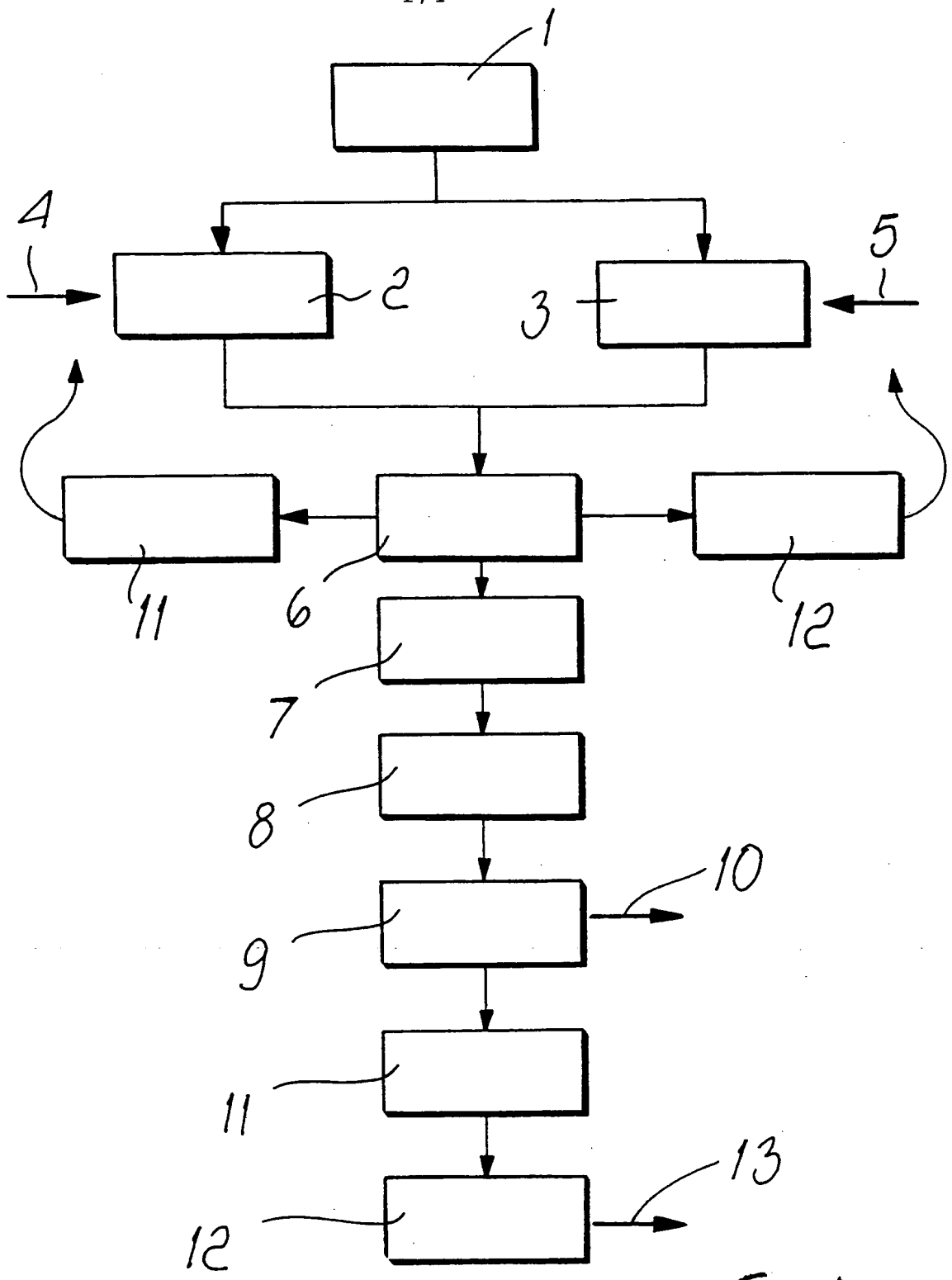


Fig. 1

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
26 April 2001 (26.04.2001)

PCT

(10) International Publication Number
WO 01/29714 A3

(51) International Patent Classification[7]: G06F 17/50, H02J 3/00

(21) International Application Number: PCT/EP00/09681

(22) International Filing Date:
28 September 2000 (28.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
MI99A002164 15 October 1999 (15.10.1999) IT

(71) Applicant *(for all designated States except US)*: **ABB SERVICE S.R.L.** [IT/IT]; Via Arconati, 1, I-20135 Milano (IT).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **TORMENE, Guido** [IT/IT]; Via Montepulciano, 11, I-20124 Milano (IT). **SOZZI, Luigi** [IT/IT]; Via Luciano Manara, 57, I-27051 Cava Manara (IT). **GORLA, Fausto** [IT/IT]; Via Delle Tuberose, 4, I-20146 Milano (IT).

(74) Agent: **GIAVARINI, Francesco**; ABB Ricerca S.p.A., Viale Edison, 50, I-20099 Sesto San Giovanni (IT).

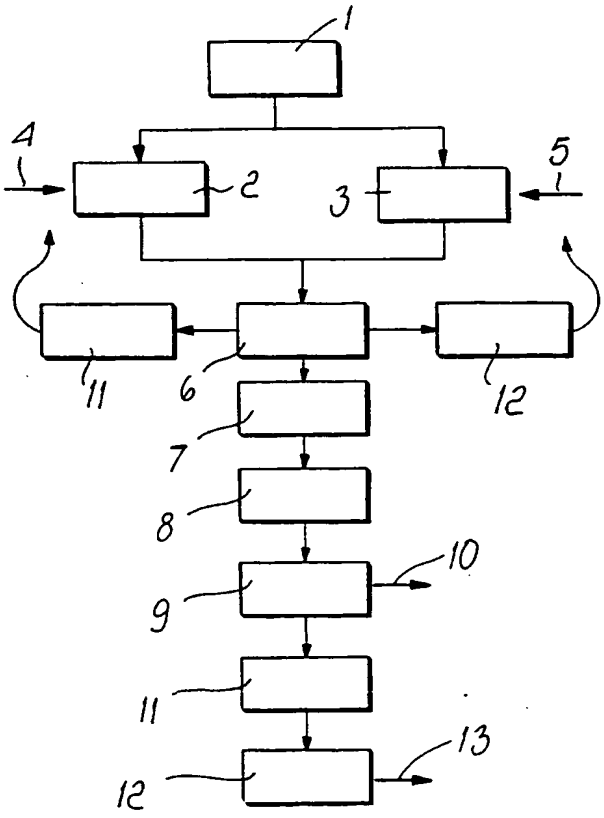
(81) Designated States *(national)*: AT, AU, BG, BR, CA, CN, CZ, DE, DK, ES, FI, GB, HR, HU, IL, IN, JP, KP, KR, LT, LU, MA, MX, NO, NZ, PL, PT, RO, RU, SE, SG, SI, SK, TR, UA, US, YU, ZA.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) Title: METHOD FOR DESIGNING AND ESTIMATING ELECTRICAL/FLUID-BASED NETWORKS



(57) Abstract: A method for performing the basic design, estimation and executive design of an electrical and/or fluid-based network, which comprises the stages of adopting a computerized medium and performing on said computerized medium a predefined sequence of steps.

WO 01/29714 A3

(88) Date of publication of the international search report:
25 April 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

Int. ional Application No
PCT/EP 00/09681

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F17/50 H02J3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F H02J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 48364 A (NETWORK TOOLS) 29 October 1998 (1998-10-29)	1-5,8
A	page 4 -page 5, line 11 page 11, line 21 -page 12, line 10 page 13, line 19 -page 14, line 2 figure 2	6,7
X	WO 94 23372 A (TRILOGY DEV GROUP) 13 October 1994 (1994-10-13)	1,8
A	page 9, line 18 -page 14 page 17, line 10 -page 16	2-7
A	US 5 604 892 A (NUTTALL DAVID J H ET AL) 18 February 1997 (1997-02-18) column 5, line 10 -column 7, line 20 column 13, line 50 -column 14, line 22 figure 1	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 November 2001	16/11/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Guingale, A

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte ional Application No
PCT/EP 00/09681

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 9848364	A	29-10-1998	US	6058262 A	02-05-2000
			AU	7120998 A	13-11-1998
			WO	9848364 A1	29-10-1998
			US	2001034591 A1	25-10-2001
WO 9423372	A	13-10-1994	US	5515524 A	07-05-1996
			AU	715256 B2	20-01-2000
			AU	6363598 A	18-06-1998
			AU	685451 B2	22-01-1998
			AU	6494794 A	24-10-1994
			BR	9406179 A	06-02-1996
			CA	2158153 A1	13-10-1994
			EP	0719432 A1	03-07-1996
			JP	8509309 T	01-10-1996
			WO	9423372 A1	13-10-1994
			US	6115547 A	05-09-2000
			US	5708798 A	13-01-1998
			US	6002854 A	14-12-1999
US 5604892	A	18-02-1997	AU	4843693 A	29-03-1994
			CA	2143652 A1	17-03-1994
			EP	0658260 A1	21-06-1995
			WO	9406087 A1	17-03-1994